MATERIALS CONCERNING THE BIOLOGY OF THE PSEUDOTUBERCULOSIS BACTERIOPHAGE

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In the literature available to us we have not encountered any works dealing with the study of the serological properties and a single cycle of multiplication of the pseudotuberculosis bacteriophage. We studied these properties in the Kotlyarovaya and D'Erell strains of the pseudotuberculosis bacteriophage, and also the serological properties of phages No 1306 and No 1613.

Phage 1306 was isolated by T. P. Kudinova (1959) from an avirulent strain of the plague microbe. On the basis of a study of specificity, the titer according to Appelman and the neutralization reaction with polyvalent antiphage plague serum (based on the Method of Marina), T. P. Kudinova together with L. M. Osadchaya (1961) preliminarily identified phage 1306 as pseudotuberculosis.

Phage 1613 was isolated by L. M. Osadchaya in January 1961 from a virulent strain of the plague microbe No 1613.

Plague microbe No 1613 was isolated on 19 Sep 1960 from Xenopsylla skrjabini fleas, collected from great gerbil burrows in the Katy natural landmark area of the Kzyl-Ordinskaya Oblast.

Phages 1613 and 1306 were passaged five times on plague microbe strain No 319, and phages Kotlyarovaya and D'Erell were passaged five times on strain No 62 of the pseudotuberculosis microbe. As the nutrient medium we used Hottinger broth with a pH of 7.5 and a residual amine nitrogen of 50--60 mg/%. Antiphage sera were obtained by means of immunizing rabbits with the above specified phages. Three rabbits were used for each phage. Each of the rabbits received 5 ml of the appropriate phage twice a week for a period of five weeks. The antiphage sera were obtained in 14 days after the completion of the injections. The serological properties of the phages were studied in the cross neutralization reactions with homologous and heterologous antiphage sera according to Adams with a calculation of the neutralization rate constant. On the

basis of the data obtained we determined the values of the constants for Kotlyarovava, D'Erell, No 1613 and No 1306 phages within the limits of 1.2--47.2 minutes.

It is known that the value of the constant during the cross neutralization reaction serves as evidence of the serological affinity between phages. Based on the data obtained, stemming from the constant of the neutralization rate, phages No 1613 and No 1306 are serologically related to the pseudotuberculosis phages of Kotlyarovaya and D'Erell. We were also interested in the problem of the serological affinity between plague and pseudotuberculosis bacteriophages. Thus, with a dilution of antiphage sera of 1:5 and following a 10-minute contact, the cross reaction between phages Kotlyarovaya, D'Erell, No 1613 and No 1306 and 13 plague antiphage sera, and also between 13 strains of plague bacteriophage and with the antiphage sera of the phage Kotlyarovaya, D'Erell, No 1613 and No 1306, produce percentages of neutralization within the limits from 0 up to 44.4.

From the data obtained it is impossible to calculate the constant of the rate of neutralization due to the low percentage of inactivation of phage particles (a calculation of the constant of the rate of the neutralization reaction is possible only with an inactivation of phage within the limits of from 90 up to 99%).

The data obtained shows that the plague and pseudotuberculosis bacteriophages are quite different from each other serologically and make up independent serological groups.

Further we studied a single cycle of multiplication of the pseudotuberculosis phages of Kotlyarovaya and D'Erell, according to the method of Ellis and Delbruk (1939). The duration of the latent period for Kotlyarovaya phage turned out to be equal to 20 minutes, and for D'Erell phage -- 21 minutes. The average "harvest" of phage particles for one infected bacterial cell comprised 92 for the Kotlyarovaya phage, and 82 for the D'Erell phage

Thus, based on the duration of the latent period the test strains of the pseudotuberculosis bacteriophage hardly differed from the plague phages.